
Tecton ARCHITECTS

PACHECO ROSS ARCHITECTS
CES
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ODEH ENGINEERS
RLB

# LEXINGTON POLICE HEADQUARTERS

# Agenda

- Temporary Police Bid Results
- Police Station Design Development 100% Phase Review
  - Document Review
  - Energy Model Review
  - LEED/LEX Update
  - Red List Update
  - Budget Update
- Solar Canopies Update

# Temporary Police Bid Results

# BID RESULTS

## Temp Police Station:

- *General Contractor bids received on 1/27/2022*
  - *(10) General Contractors submitted bids*
  - *GC construction estimated budget was approximately $350,000*
  - *Marino Construction is the apparent low bidder @ $351,100*
    - *Low FSBs were carried in their bid.*

  - *Bidding notes:*
  - *High bidder was $604,000*
  - *Average bid was $438,200*

  - *Low bidders are being reviewed and Tecton will provide a letter of recommendation shortly if there are no issues or irregularities.*

# Police HQ Design Development 100% Phase Review

# DOCUMENT STATUS

## Design Development Documents:

- *Delivered on January 10, 2022 to the Town of Lexington, Estimator, Energy Modeler, Peer reviewers and Town's Cx*
    - *2 Volumes of specifications*
    - *171 30x42" Sheets*

- *Design Development Estimate Received on 1/27/22*
- *Energy model results Received on 1/27/22*
- *HDC Application has been filed ahead of the 2/3 deadline. Supplemental documentation is being developed and will be issued later this month*
- *SB Presentation for DD closeout / Approval to proceed to CD scheduled for 2/7/22*

# FLOOR PLANS


**FIRST FLOOR**


**SECOND FLOOR**

# ELEVATIONS


**SOUTH ELEVATION**

# ELEVATIONS

**EAST ELEVATION**

# ELEVATIONS

**NORTH ELEVATION**

# ELEVATIONS

**WEST ELEVATION**

Rendering from Mass Ave

# RENDERINGS

POLICE HEADQUARTERS | 100% DD

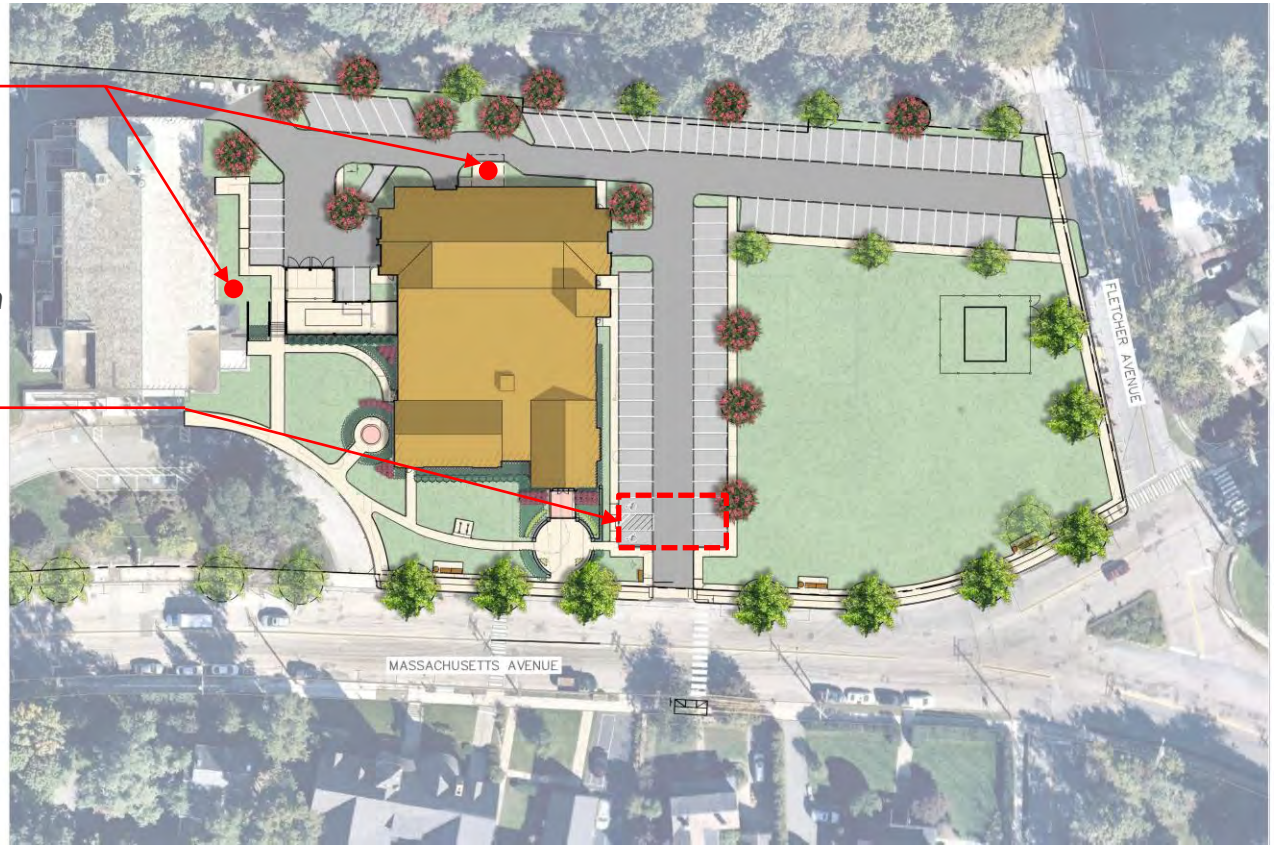
# SITE PLAN

# SITE PLAN

*Tower location options*

*HDC recommends removal of Parking spaces at front of Building for continuity between Municipal campus and Fletcher Field*

*Parking space count:*
*Existing - 169*
*Proposed - 164*



# Integrated Design

# Design Development Energy Model

# ENERGY MODEL RESULTS - SUMMARY

NEW ECOLOGY
Community-Based Sustainable Development

| Model Assumptions | | | |
|---|---|---|---|
| | **LEED Baseline Model** | **90.1-2013 Baseline Model** | **Proposed Design Model** |
| Modeling Guideline/Code | ASHRAE 90.1-2010 | ASHRAE 90.1-2013 | DD Design Drawing Set -LEX02AR02 |
| Wall | U-0.064 (R-13+R-7.5 c.i.)) | U-0.055 (R-13+R-10 c.i.) | U-0.027 (R-37) |
| Roof | U-0.048 (R-20 c.i.) | U-0.032 (R-30 c.i.) | U-0.022 (R-45) |
| Window | U-0.35 / SHGC- 0.4 | U-0.32 / SHGC - 0.4 | U-0.23 / SHGC - 0.23 |
| HVAC | Packaged VAV with PFP Boxes | Packaged VAV with Reheat | VRF + DOAS |
| Heating Energy Source | Electricity | Natural Gas | Electricity |
| Cooling Energy Source | Electricity | Electricity | Electricity |
| Heating Efficiency | Electric Resistance | 80% Et Boiler | VRF - 4.2 COP / DOAS -3.31 COP |
| Cooling Efficiency | 10 EER | 9.8 EER | VRF - 4.15 COP / DOAS - 12 EER |
| **Simulation Results** | | | |
| | **LEED Baseline Model** | **90.1-2013 Baseline Model** | **Proposed Design Model** |
| Site Electricity Energy Use (kWh) | 576,017 | 349,594 | 385,800 |
| Site Natural Gas Energy Use (Therm) | 0 | 5,504 | 0 |
| Total Site Energy Use (kBtu) | 1,965,369 | 1,743,790 | 1,316,350 |
| Site EUI (kBtu/SF) | 60 | 53 | 40 |
| **Energy Analysis** | | | |
| | **LEED Model** | **90.1-2013 Model** | **Note** |
| Savings % | 33% (Cost Savings) | 24% (Energy Savings) | without Solar PV |
| Result | 12 points - LEED minimum performance credit | | |

| Solar PV | | | |
|---|---|---|---|
| | **LEED Baseline Model** | **90.1-2013 Baseline Model** | **Proposed Design Model** |
| Total Site Energy Use (kBtu) | 1,965,369 | 1,743,790 | 1,316,350 |
| Solar PV Production (kWh/yr) | 0 | 0 | 388,000 |
| Total Site Energy Use minus solar PV production (kBtu) | 1,965,369 | 1,743,790 | -7,506 |
| Site EUI with solar (kBtu/SF) | 60 | 53 | 0 |
| **Energy Analysis with Solar PV** | | | |
| | **LEED Model** | **90.1-2013 Model** | **Note** |
| Savings % | 100% (Cost Savings) | 100% (Energy Savings) | includes solar PV |
| Result | 18 points + 1 exemplary performance credit | | |

# LEED/LEX Scorecard Update

# LEED/LEX SCORECARD

| Y | ? | N | | | |
|---|---|---|---|---|---|
| 1 | | | Credit | Integrative Process | 1 |
| 7 | 0 | 25 | **Location and Transportation** | | 32 |
| | | 16 | Credit | LEED for Neighborhood Development Location | 16 |
| 1 | | | Credit | Sensitive Land Protection | 1 |
| 1 | | 1 | Credit | High Priority Site | 2 |
| 2 | | 3 | Credit | Surrounding Density and Diverse Uses | 5 |
| | | 5 | Credit | Access to Quality Transit | 5 |
| 1 | | | Credit | Bicycle Facilities | 1 |
| 1 | | | Credit | Reduced Parking Footprint | 1 |
| 1 | | | Credit | Green Vehicles | 1 |
| 8 | 2 | 0 | **Sustainable Sites** | | 10 |
| Y | | | Prereq | Construction Activity Pollution Prevention | Required |
| 1 | | | Credit | Site Assessment | 1 |
| 2 | | | Credit | Site Development - Protect or Restore Habitat | 2 |
| 1 | | | Credit | Open Space | 1 |
| 3 | | | Credit | Rainwater Management | 3 |
| | 2 | | Credit | Heat Island Reduction | 2 |
| 1 | | | Credit | Light Pollution Reduction | 1 |
| 4 | 2 | 5 | **Water Efficiency** | | 11 |
| Y | | | Prereq | Outdoor Water Use Reduction | Required |
| Y | | | Prereq | Indoor Water Use Reduction | Required |
| Y | | | Prereq | Building-Level Water Metering | Required |
| 1 | 1 | | Credit | Outdoor Water Use Reduction | 2 |
| 2 | 1 | 3 | Credit | Indoor Water Use Reduction | 6 |
| | | 2 | Credit | Cooling Tower Water Use | 2 |
| 1 | | | Credit | Water Metering | 1 |
| 23 | 2 | 8 | **Energy and Atmosphere** | | 33 |
| Y | | | Prereq | Fundamental Commissioning and Verification | Required |
| Y | | | Prereq | Minimum Energy Performance | Required |
| Y | | | Prereq | Building-Level Energy Metering | Required |
| Y | | | Prereq | Fundamental Refrigerant Management | Required |
| 5 | 1 | | Credit | Enhanced Commissioning | 6 |
| 12 | 1 | 5 | Credit | Optimize Energy Performance - The town will target onsite building energy use intensity (kBTUs/sq ft) for new buildings to be 30% less than ASHRAE 90.1-(current version) | 18 |
| 1 | | | Credit | Advanced Energy Metering | 1 |
| | 0 | 2 | Credit | Demand Response - Install and properly maintain a building management system to track and manage peak demand for energy cost reduction and emergency load shedding | 2 |
| 3 | | | Credit | Renewable Energy Production - Target at least 20% onsite renewable energy, may be supplemented with offsite energy. | 3 |
| Y | | | Lex | Utilize energy storage when cost effective to lower peak demand charges and integrate with onsite solar Commissioning/Retro-Commissioning | |
| | | 1 | Credit | Enhanced Refrigerant Management | 1 |
| 2 | | | Credit | Green Power and Carbon Offsets | 2 |
| Y | | | Lex | Evaluate and present options for achieving net zero energy use | |
| Y | | | Lex | All electric, zero emissions on site design (excluding fuel for emergency backup power generators and backup heating systems). | |
| 5 | 1 | 5 | **Materials and Resources** | | 13 |
| Y | | | Prereq | Storage and Collection of Recyclables | Required |
| Y | | | Prereq | Construction and Demolition Waste Management Planning | Required |
| | | 3 | Credit | Building Life-Cycle Impact Reduction | 5 |
| 1 | | 1 | Credit | Building Product Disclosure and Optimization - Environmental Product Declarations | 2 |
| 1 | 1 | | Credit | Building Product Disclosure and Optimization - Sourcing of Raw Materials | 2 |
| 1 | | 1 | Credit | Building Product Disclosure and Optimization - Material Ingredients | 2 |
| 2 | | | Credit | Construction and Demolition Waste Management | 2 |
| 11 | 1 | 4 | **Indoor Environmental Quality** | | 16 |
| Y | | | Prereq | Minimum Indoor Air Quality Performance | Required |
| Y | | | Prereq | Environmental Tobacco Smoke Control | Required |
| 2 | | | Credit | Enhanced Indoor Air Quality Strategies | 2 |
| 2 | 1 | | Credit | Low-Emitting Materials | 3 |
| 1 | | | Credit | Construction Indoor Air Quality Management Plan | 1 |
| 1 | | 1 | Credit | Indoor Air Quality Assessment | 2 |
| 1 | | | Credit | Thermal Comfort | 1 |
| 2 | | | Credit | Interior Lighting | 2 |
| 1 | | 2 | Credit | Daylight | 3 |
| | | 1 | Credit | Quality Views | 1 |
| 1 | | | Credit | Acoustic Performance | 1 |
| Y | | | Lex | Enhanced Filtration - Install and properly maintain particulate matter filters as appropriate for building type and use to protect health of the occupant. | |
| Y | | | Lex | Indoor CO2 levels per Lexington Board of Health guidelines. (BOH Memo dated December 16, 2015, Table 1) | |
| Y | | | Lex | Toxics - Avoid the use of red list substances as recommended by Lexington Board of Health (memo dated March 4, 2018), except when no practical alternative is available. Utilize Healthy Building Network (or equivalent) information in the design and selection of materials and consider using products and services established by the Environmentally Preferable Purchasing program or other successor program of the Commonwealth of Massachusetts or other similar cooperative purchasing programs | |
| 4 | 0 | 2 | **Innovation** | | 6 |
| 1 | | | Credit | Innovation : Green Building Education | 1 |
| 1 | | | Credit | Innovation : Purchasing - Lamps | 1 |
| 1 | | | Credit | Exemplary Performance: Renewable Energy Production (15%) | 1 |
| | | 1 | Credit | Innovation | 1 |
| | | 1 | Credit | Innovation | 1 |
| 1 | | | Credit | LEED Accredited Professional | 1 |
| 3 | 0 | 1 | **Regional Priority** | | 4 |
| 1 | | | Credit | Regional Priority: Renewable Energy Production (Achieve 3 points) | 1 |
| | | 1 | Credit | Regional Priority: Building Life Cycle Impact Reduction (Achieve 2 points) | 1 |
| 1 | | | Credit | Regional Priority: Site Development - Protect or Restore Habitat (Achieve 2 points) | 1 |
| 1 | | | Credit | Regional Priority: Optimize Energy Performance (Achieve 8 points) | 1 |
| Y | | | Lex | Buildings shall be designed to deliver services based on the resilience levels defined in the Integrated Design Procedure. The resilience level for a particular building shall be determined in consultation with the building stakeholders and shall be consistent with the planned use of the building in the Town's Emergency Management Plan | |
| 66 | 8 | 50 | **TOTALS** | Possible Points: | 110 |

**Certified:** 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110

Lexington minimum target range is 50-59 points

# Red List Update

# RED LIST STATUS

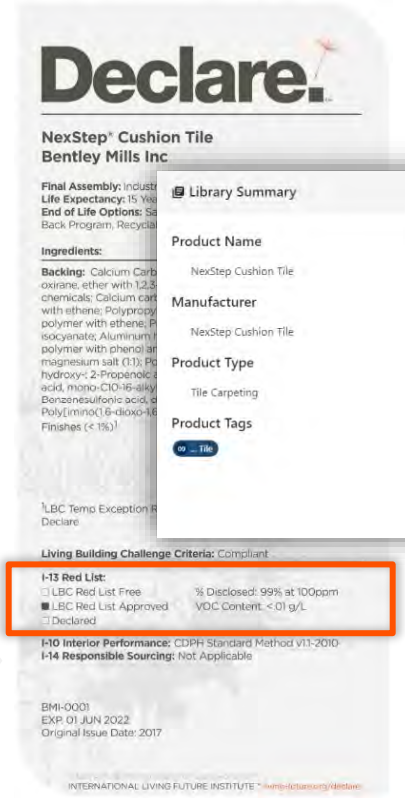
Project is pursuing Red List compliance for the following CSI Divisions:

- *Division 3: Concrete*
- *Division 7: Thermal Moisture Protection*
- *Division 9: Finishes*
- *Division 12: Furnishings*
- *~97% in compliance – working on last 3%*
- *Process continues until project closeout*

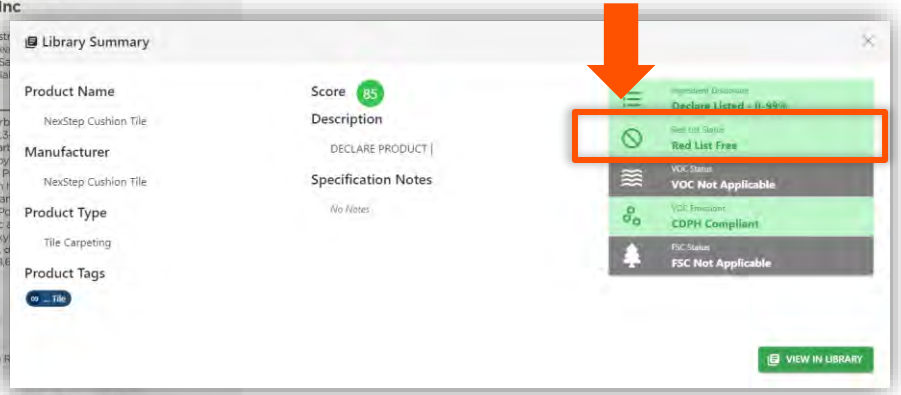
**CARPET TILE EXAMPLE:**

Bentley NexStep
"***Redacted***"

- Conference Rooms / Offices Option




From the **red2green** library




From the **manufacturer**

# Budget Update

Budget history slide

| | 2020 Temporary Police | | Bid Results Temporary Police | | Schematic Design NEW POLICE | | July 2020 NEW + TEMP. | Design Development NEW POLICE | | Feb. 2022 NEW + TEMP. |
|---|---|---|---|---|---|---|---|---|---|---|
| **Facility Construction Costs** | | | | | | 30,081 s.f. | $443 | | 34,203 s.f. | $600 |
| Construction estimated net cost: | | $84,800 | | $351,100 | | $13,313,552 | $13,398,352 | | $20,510,900 | $20,862,000 |
| General Conditions/Requirements | 15.0% | $12,700 | | | 10.0% | $1,331,400 | $1,344,100 | 7.6% | $1,558,800 | incl. above |
| Bonds & Insurance | 3.0% | $2,900 | | | 3.0% | $439,300 | $442,200 | 3.0% | $662,100 | incl. above |
| Overhead & Profit | 3.5% | $3,500 | | | 4.0% | $603,400 | $606,900 | 4.0% | $909,300 | incl. above |
| Design/Estimating Contingency | 15.0% | $15,600 | | | 7.5% | $1,176,600 | $1,192,200 | 5.0% | $1,182,100 | incl. above |
| Escalation Allowance | 13.0% | $15,500 | | | 4.5% | $758,900 | $774,400 | 7.0% | $1,737,600 | incl. above |
| | | (Q3/19 to Q3/21) | | | | | (Q3/20 to Q3/21) | | | (Q1/22 to Q2/23) |
| Total Construction Costs: | | $135,000 | | $351,100 | | $17,623,152 | $17,758,152 | | $26,560,800 | $26,911,900 |
| **Suggested Adjustments and Contingencies:** | | | | | | | | | | |
| Relocate Hosmer House | | $0 | | $0 | | $1,100,000 | $1,100,000 | LS | $300,000 | $300,000 |
| Unsuitable Soils Allowance | | $0 | | $0 | LS | $500,000 | $500,000 | LS | $500,000 | $500,000 |
| Owner's Construction Contingency | 10.0% | $13,500 | 10.0% | $35,100 | 10.0% | $1,762,300 | $1,775,800 | 7.5% | $1,992,100 | $2,027,200 |
| Total Adjustments and Contingency Costs: | | $13,500 | | $386,200 | | $3,362,300 | $3,375,800 | | $2,792,100 | $3,178,300 |
| **Project Development and Equipment Costs** | | | | | | | | | | |
| Initial Study | | | | | | $59,250 | $59,250 | | $59,250 | $59,250 |
| Designer Fees | | $11,900 | | $11,900 | | $2,090,540 | $2,102,440 | | $2,090,540 | $2,102,440 |
| Additional Fee | | | | $41,100 | | 0 | $0 | | $428,840 | $469,940 |
| Interior Furnishings and Loose Equipment | | $5,000 | | $5,000 | | $300,000 | $305,000 | | $300,000 | $305,000 |
| Communications Equipment Allowance | | $65,000 | | $65,000 | | $650,000 | $715,000 | | $650,000 | $715,000 |
| Building Technology | | $0 | | $0 | | $0 | $0 | | $250,000 | $250,000 |
| Hazardous Materials Abatement Allowance | | $0 | | $0 | | $140,000 | $140,000 | | $140,000 | $140,000 |
| Hygenists Fees | | $0 | | $0 | | $50,000 | $50,000 | | $50,000 | $50,000 |
| Mass. Ave. Site Investigation | | $0 | | $0 | | $42,000 | $42,000 | | $42,000 | $42,000 |
| Geotech CA services allowance | | $0 | | $0 | | $40,000 | $40,000 | | $40,000 | $40,000 |
| Red List Designer Fees | | $0 | | $0 | | $35,000 | $35,000 | | $35,000 | $35,000 |
| FF&E Design Fees | | $0 | | $0 | | $35,000 | $35,000 | | $35,000 | $35,000 |
| Communications Equipment Consultant | | $0 | | $0 | | $105,000 | $105,000 | | $105,000 | $105,000 |
| OPM Fees | | $0 | | $0 | | $350,000 | $350,000 | | $475,000 | $475,000 |
| Building Commissioning | | $0 | | $0 | | $75,000 | $75,000 | | $75,000 | $75,000 |
| Envelope Commissioning | | $0 | | $0 | | $20,000 | $20,000 | | $20,000 | $20,000 |
| Materials Testing | | $0 | | $0 | | $65,000 | $65,000 | | $65,000 | $65,000 |
| Relocation Costs (by owner) | | $25,000 | | $25,000 | | $50,000 | $75,000 | | $50,000 | $75,000 |
| Bidding Expenses | | $7,500 | | $7,500 | | $10,000 | $17,500 | | $10,000 | $17,500 |
| Legal Fees (by owner) | | $5,000 | | $5,000 | | $5,000 | $10,000 | | $5,000 | $10,000 |
| Project Development Contingency | | $11,900 | | $16,100 | | $340,300 | $352,200 | | $340,300 | $356,400 |
| | | $131,300 | | $176,600 | | $4,402,840 | $4,534,140 | | $5,265,930 | $5,442,530 |
| Total Opinion of Probable Project Costs: | | **$279,800** | | **$913,900** | | **$25,388,292** | **$25,668,092** | | **$34,618,830** | **$35,532,730** |

# POLICE HEADQUARTERS | BUDGET

# Summary of budget modifications over the past 2 years

- Budget delta in hard costs from July 2020 to February 2022 =$8,937,648
- Increase in Sq ft. 4,122 sq ft * 776($/sq ft) = $3,198,672
- Escalation $17,623,152 * 20% (divided by 12 months) = $293,719
- $293,719 * (18 months) = $5,286,946
- $428,840 in additional fees
- $250,000 in building technology
- OPM fee line item increased by $125,000 (construction duration was extended from 13-18 months)
- Total increase in escalation & added square footage = $9,286,458
- Escalation at current number between 155,000 (7%) to 442,680 (20%) per month. This was ~100,000 / month in 2018

| Design Development NEW POLICE | | Feb. 2022 NEW + TEMP. |
|---|---|---|
| | 34,203 s.f. | $600 |
| | $20,510,900 | $20,862,000 |
| 7.6% | $1,558,800 | incl. above |
| 3.0% | $662,100 | incl. above |
| 4.0% | $909,300 | incl. above |
| 5.0% | $1,182,100 | incl. above |
| 7.0% | $1,737,600 | incl. above |
| | | (Q1/22 to Q2/23) |
| | $26,560,800 | $26,911,900 |
| LS | $300,000 | $300,000 |
| LS | $500,000 | $500,000 |
| 7.5% | $1,992,100 | $2,027,200 |
| | $2,792,100 | $3,178,300 |
| | $59,250 | $59,250 |
| | $2,090,540 | $2,102,440 |
| | $428,840 | $469,940 |
| | $300,000 | $305,000 |
| | $650,000 | $715,000 |
| | $250,000 | $250,000 |
| | $140,000 | $140,000 |
| | $50,000 | $50,000 |
| | $42,000 | $42,000 |
| | $40,000 | $40,000 |
| | $35,000 | $35,000 |
| | $35,000 | $35,000 |
| | $105,000 | $105,000 |
| | $475,000 | $475,000 |
| | $75,000 | $75,000 |
| | $20,000 | $20,000 |
| | $65,000 | $65,000 |
| | $50,000 | $75,000 |
| | $10,000 | $17,500 |
| | $5,000 | $10,000 |
| | $340,300 | $356,400 |
| | $5,265,930 | $5,442,530 |
| | **$34,618,830** | **$35,532,730** |

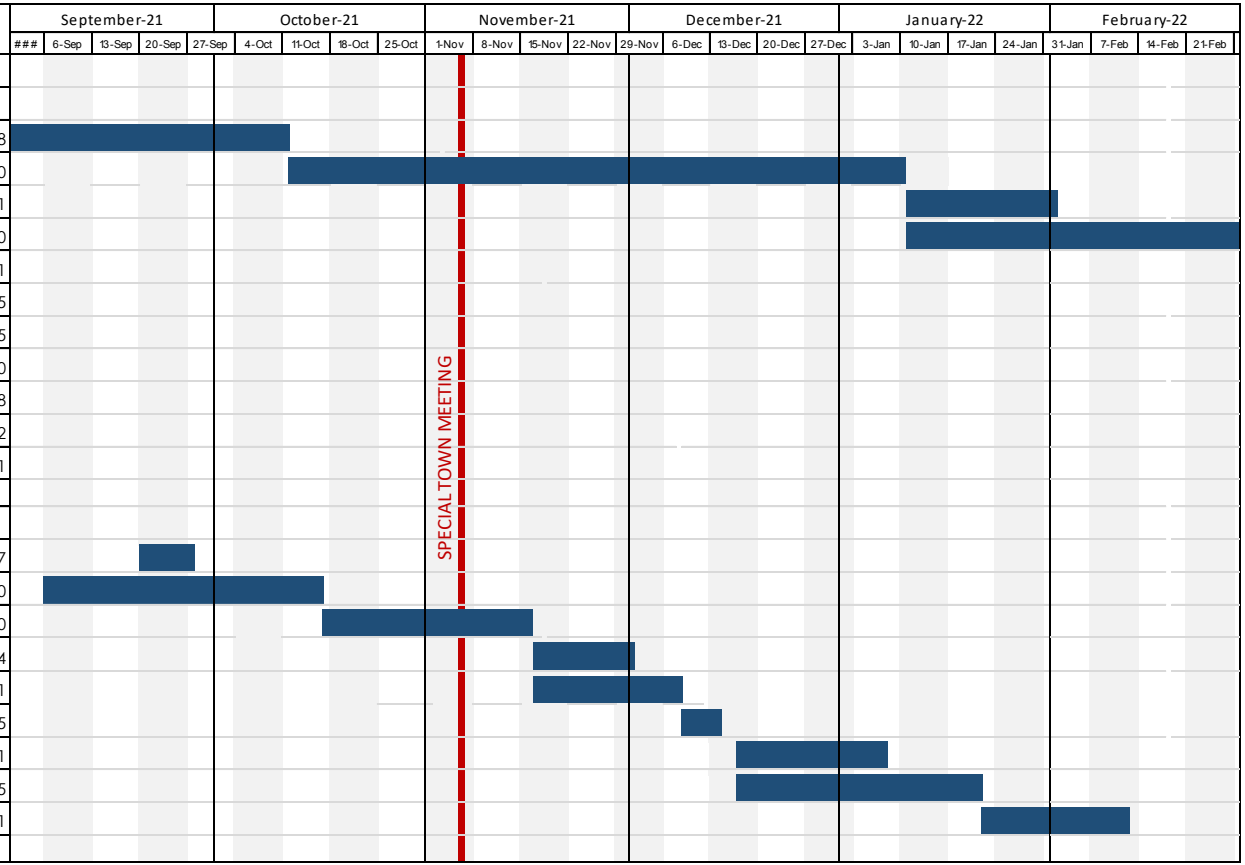
# VE OPTIONS – NET COSTS

| | |
|---|---|
| • *Deduct Social Services fit-out (vanilla box)* | *-$105,000* |
| • *Deduct Multi-purpose fit-out (vanilla box)* | *-$50,000* |
| • *Deduct glass & millwork partitions at offices and replace with drywall partitions and HM doors* | *-$75,000 (will require additional costs in FFE for storage & wardrobes)* |

# VE OPTIONS – NET COSTS

| | |
|---|---|
| • *Remove dormer at rear of building* | *$ Pending* |
| • *Cast stone base & door surrounds at exterior in lieu of brownstone* | *$116,150* |
| • *Omit clean agent fire suppression from IT server room & evidence storage* | *$160,000* |
| • *Omit high density storage system for evidence storage & Records* | *$225,000* |
| • *Remove Parking garage / Vehicle Maintenance – leave as open air parking with building extend over parking. (approx. 6,000 sq. ft.)* | *$ Unknown* |

| Lexington Police Project Schedule | | | |
|---|---|---|---|
| **New Police Headquarters** | START | END | DUR. |
| Schematic Design | | 7/14/2020 | |
| Community Conversation Response | 8/24/2021 | 10/11/2021 | 48 |
| Design Development | 10/12/2021 | 1/10/2022 | 90 |
| Design Development Estimate | 1/11/2022 | 2/1/2022 | 21 |
| 50% Construction Documents | 1/11/2022 | 3/2/2022 | 50 |
| 50% Construction Document Estimate | 3/3/2022 | 3/24/2022 | 21 |
| 100% Construction Documents | 3/3/2022 | 5/7/2022 | 65 |
| Bidder Prequalification | 4/12/2022 | 5/17/2022 | 35 |
| Authorization to Proceed to Bid | 5/18/2022 | 6/7/2022 | 20 |
| Filed Sub bid Period | 6/10/2022 | 7/8/2022 | 28 |
| General Bid Period | 6/10/2022 | 7/22/2022 | 42 |
| Construction Contract Award | 7/23/2022 | 8/13/2022 | 21 |
| | | | |
| **Temporary Police Facility** | | | |
| 50% Design Development Estimate | 9/20/2021 | 9/27/2021 | 7 |
| Design Development | 9/6/2021 | 10/16/2021 | 40 |
| 80% Construction Documents | 10/17/2021 | 11/16/2021 | 30 |
| 80% Construction Document Estimate | 11/17/2021 | 12/1/2021 | 14 |
| 100% Construction Documents | 11/17/2021 | 12/8/2021 | 21 |
| Authorization to Proceed to Bid | 12/9/2021 | 12/14/2021 | 5 |
| Filed Sub Bid Period | 12/17/2021 | 1/7/2022 | 21 |
| General Bid Period | 12/17/2021 | 1/21/2022 | 35 |
| Construction Contract Award | 1/22/2022 | 2/12/2022 | 21 |
| | | | |




# PROJECT SCHEDULE – MOVING FORWARD

| Lexington Police Project Schedule | | | |
|---|---|---|---|
| **New Police Headquarters** | START | END | DUR. |
| Schematic Design | | 7/14/2020 | |
| Design Development | 10/12/2021 | 1/10/2022 | 80 |
| Design Development Estimate | 1/11/2022 | 2/1/2022 | 21 |
| 50% Construction Documents | 1/11/2022 | 3/2/2022 | 50 |
| 50% Construction Document Estimate | 3/3/2022 | 3/24/2022 | 21 |
| 100% Construction Documents | 3/3/2022 | 5/7/2022 | 65 |
| Bidder Prequalification | 4/12/2022 | 5/17/2022 | 35 |
| Authorization to Proceed to Bid | 5/18/2022 | 6/7/2022 | 20 |
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| | | | |
| **Temporary Police Facility** | | | |
| 50% Design Development Estimate | 9/20/2021 | 9/27/2021 | 7 |
| Design Development | 9/6/2021 | 10/16/2021 | 40 |
| 80% Construction Documents | 10/17/2021 | 11/16/2021 | 30 |
| 80% Construction Document Estimate | 11/17/2021 | 12/1/2021 | 14 |
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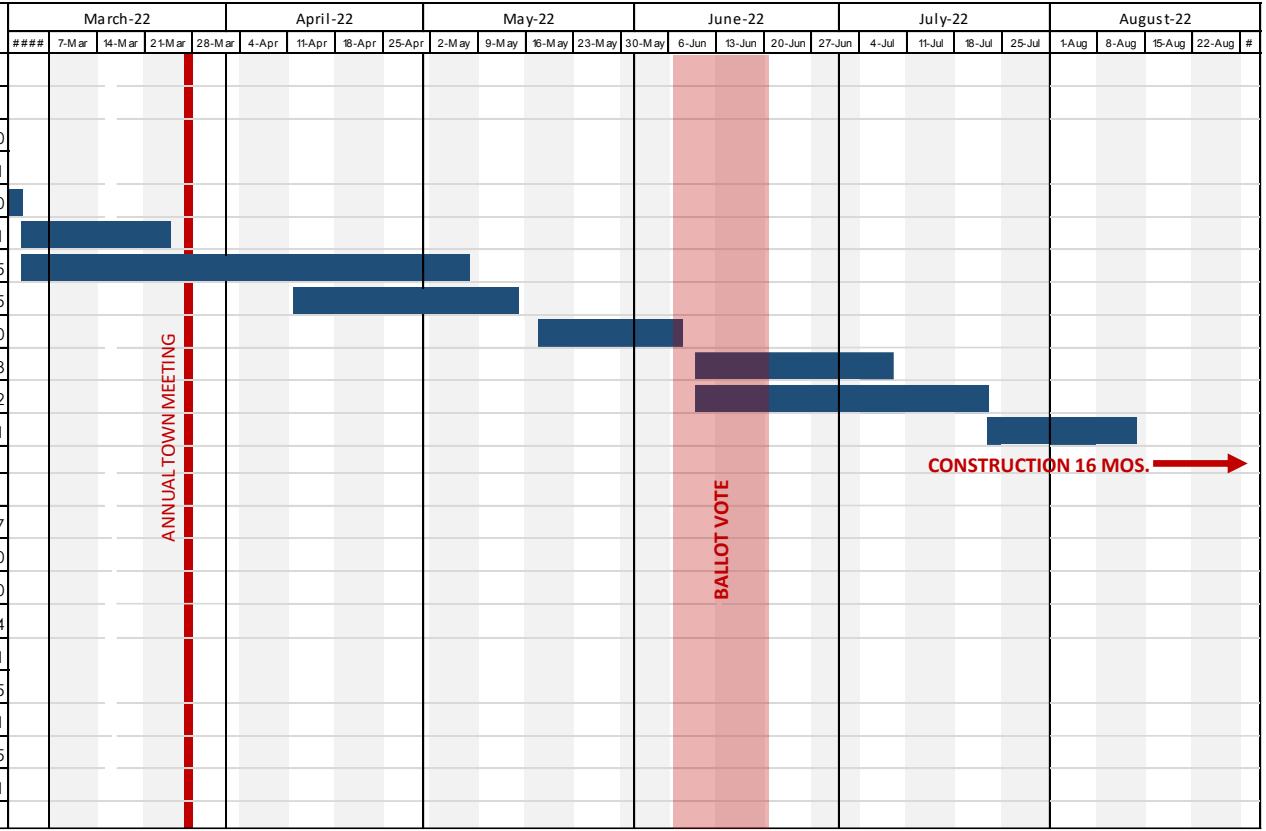
| | | | |




# PROJECT SCHEDULE – MOVING FORWARD

# Solar Canopies

# Solar PV Generation v. Consumption

- Assumed building consumption based on latest energy model = ~385,800 kWh annually
- Solar PV roof top maximum potential generation
  - Roof top – 3,300 sq ft = ~67,000 kWh annually
- **Remainder** needed to match building consumption
  - **~318,800 kWh annually**
- Potential design solutions to reach the target solar energy output
  - Solar Parking Canopy
  - Solar Pavilion over Fletcher Field
- The following slides explore these options in more detail

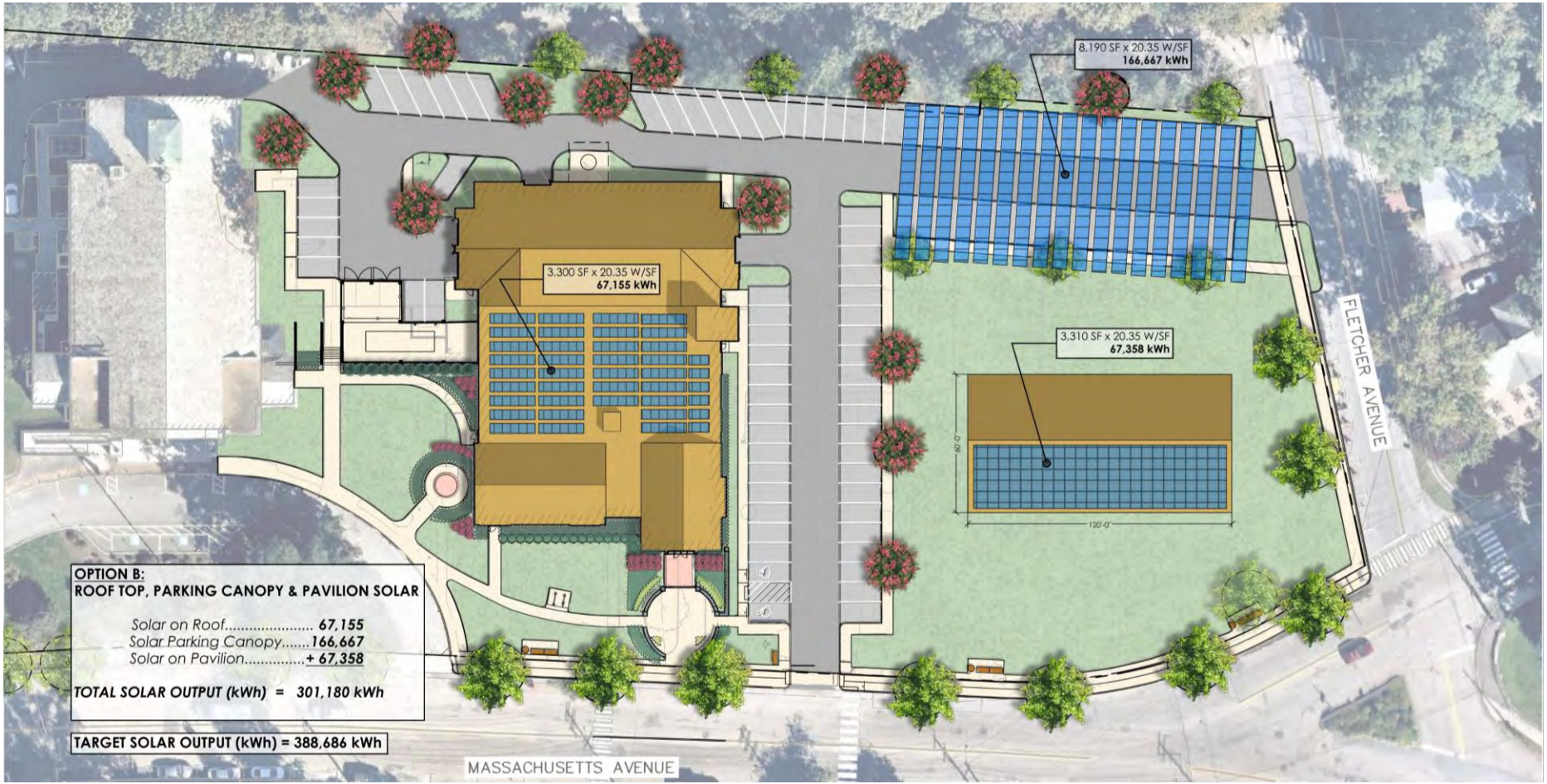

SITE PLAN


8,190 SF x 20.35 W/SF
166,667 kWh
3,300 SF x 20.35 W/SF
67,155 kWh
FLETCHER AVENUE
OPTION A:
ROOF TOP AND PAKING CANOPY
Solar on Roof..... 67,155
Solar Parking Canopy.....+ 166,667
TOTAL SOLAR OUTPUT (kWh) = 233,822 kWh
TARGET SOLAR OUTPUT (kWh) = 388,686 kWh
MASSACHUSETTS AVENUE

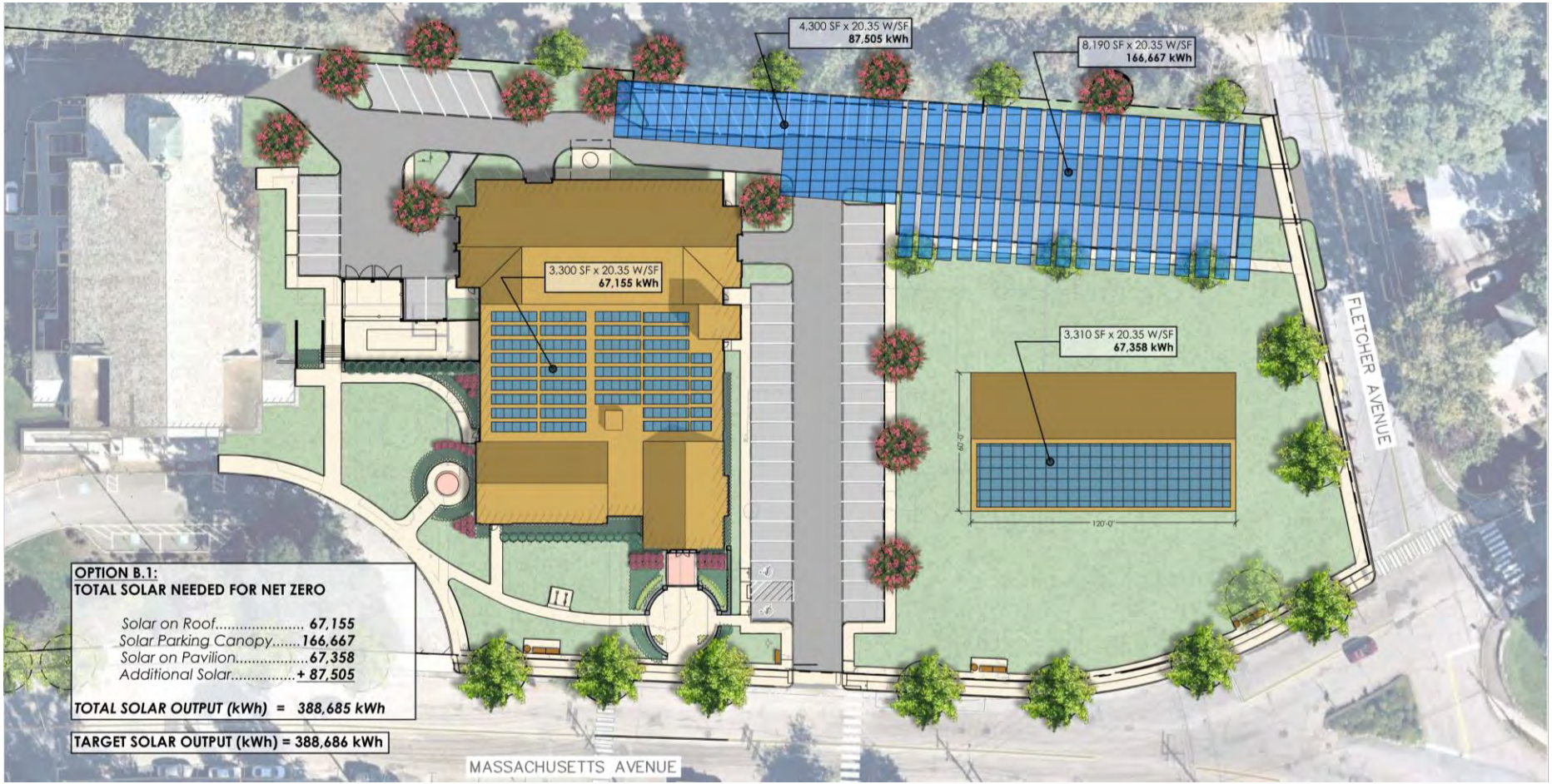
# SITE PLAN


7,600 SF x 20.35 W/SF
154,660 kWh
8,190 SF x 20.35 W/SF
166,667 kWh
3,300 SF x 20.35 W/SF
67,155 kWh
FLETCHER AVENUE
OPTION A.1:
TOTAL SOLAR NEEDED FOR NET ZERO
Solar on Roof..... 67,155
Solar Parking Canopy.....166,667
Additional Solar.....+ 154,660
TOTAL SOLAR OUTPUT (kWh) = 388,482 kWh
TARGET SOLAR OUTPUT (kWh) = 388,686 kWh
MASSACHUSETTS AVENUE

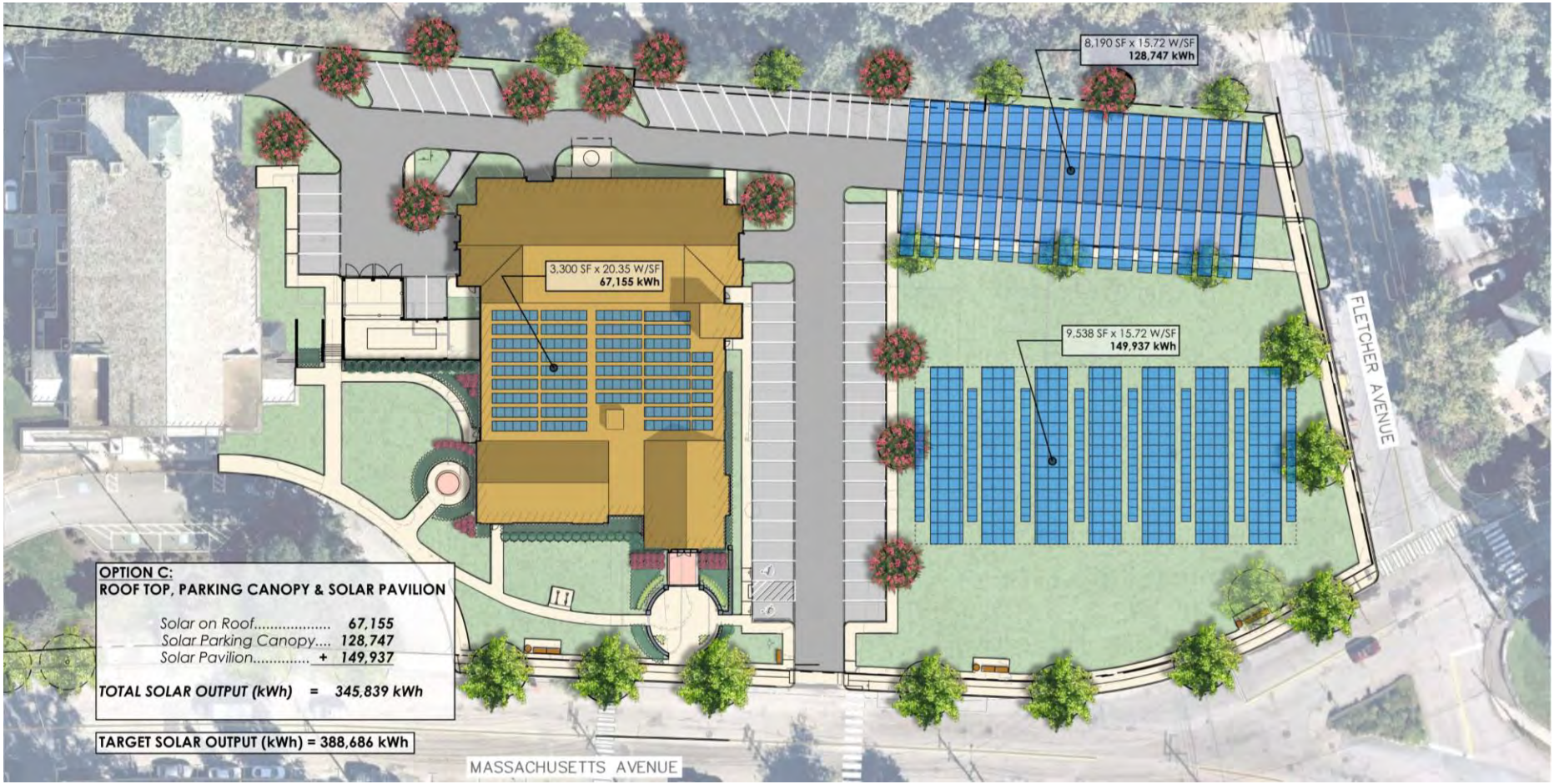
# SITE PLAN


8,190 SF x 20.35 W/SF
166,667 kWh
3,300 SF x 20.35 W/SF
67,155 kWh
3,310 SF x 20.35 W/SF
67,358 kWh
FLETCHER AVENUE
MASSACHUSETTS AVENUE
OPTION B:
ROOF TOP, PARKING CANOPY & PAVILION SOLAR
Solar on Roof..... 67,155
Solar Parking Canopy.....166,667
Solar on Pavilion.....+ 67,358
TOTAL SOLAR OUTPUT (kWh) = 301,180 kWh
TARGET SOLAR OUTPUT (kWh) = 388,686 kWh

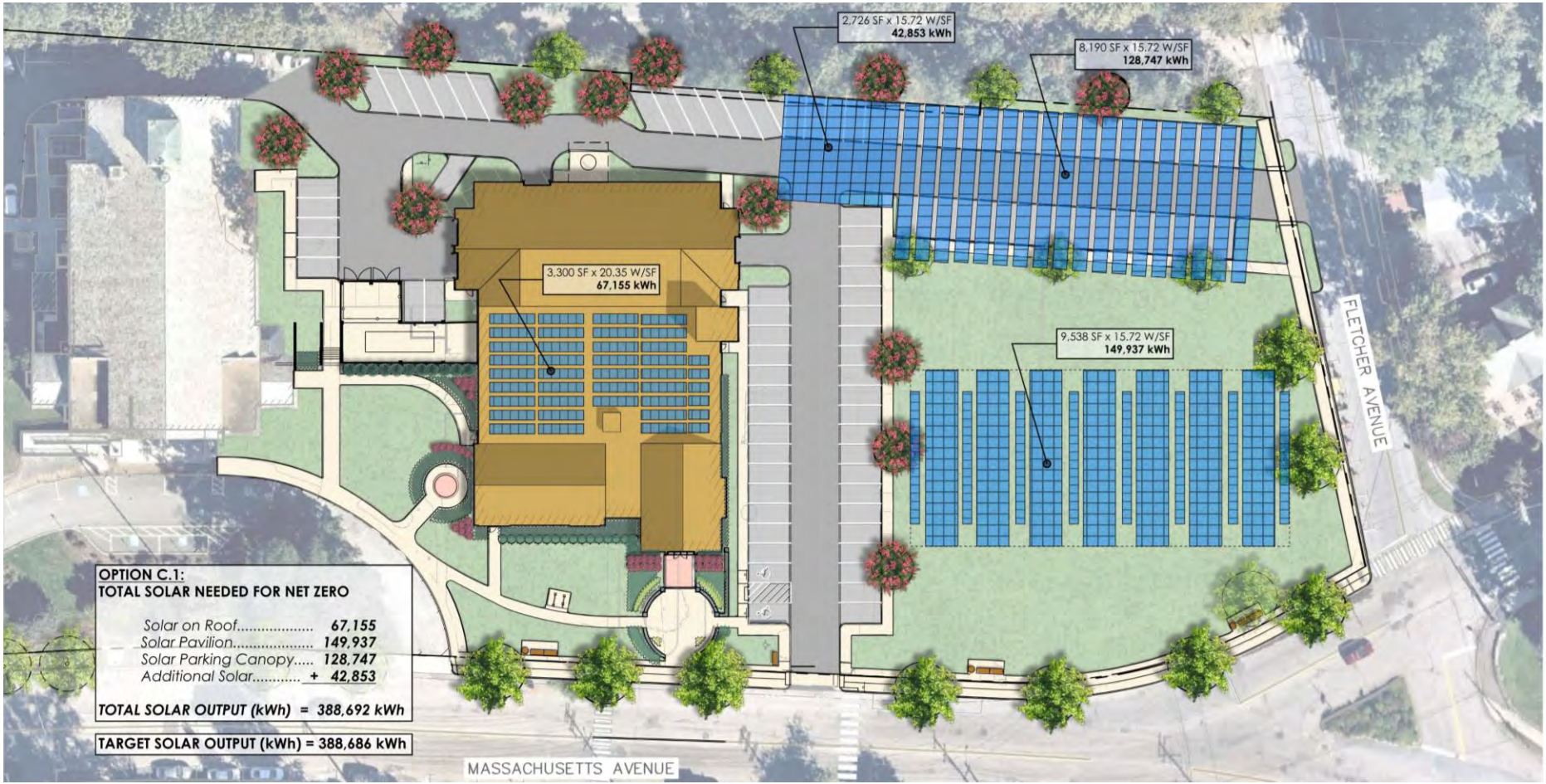
# SITE PLAN


4,300 SF x 20.35 W/SF
87,505 kWh
8,190 SF x 20.35 W/SF
166,667 kWh
3,300 SF x 20.35 W/SF
67,155 kWh
3,310 SF x 20.35 W/SF
67,358 kWh
FLETCHER AVENUE
MASSACHUSETTS AVENUE
OPTION B.1:
TOTAL SOLAR NEEDED FOR NET ZERO
Solar on Roof..... 67,155
Solar Parking Canopy.....166,667
Solar on Pavilion.....67,358
Additional Solar.....+ 87,505
TOTAL SOLAR OUTPUT (kWh) = 388,685 kWh
TARGET SOLAR OUTPUT (kWh) = 388,686 kWh

# SITE PLAN


8,190 SF x 15.72 W/SF
128,747 kWh
3,300 SF x 20.35 W/SF
67,155 kWh
9,538 SF x 15.72 W/SF
149,937 kWh
FLETCHER AVENUE
OPTION C:
ROOF TOP, PARKING CANOPY & SOLAR PAVILION
Solar on Roof..... 67,155
Solar Parking Canopy.... 128,747
Solar Pavilion..... + 149,937
TOTAL SOLAR OUTPUT (kWh) = 345,839 kWh
TARGET SOLAR OUTPUT (kWh) = 388,686 kWh
MASSACHUSETTS AVENUE

# SITE PLAN


2,726 SF x 15.72 W/SF
42,853 kWh
8,190 SF x 15.72 W/SF
128,747 kWh
3,300 SF x 20.35 W/SF
67,155 kWh
9,538 SF x 15.72 W/SF
149,937 kWh
FLETCHER AVENUE
OPTION C.1:
TOTAL SOLAR NEEDED FOR NET ZERO
Solar on Roof..... 67,155
Solar Pavilion..... 149,937
Solar Parking Canopy..... 128,747
Additional Solar..... + 42,853
TOTAL SOLAR OUTPUT (kWh) = 388,692 kWh
TARGET SOLAR OUTPUT (kWh) = 388,686 kWh
MASSACHUSETTS AVENUE

# SITE PLAN

# SOLAR CANOPY PRECEDENT IMAGES

# SOLAR PARKING CANOPY CONCEPTUAL RENDERINGS

# SOLAR PARKING CANOPY CONCEPTUAL RENDERINGS

# SOLAR PARKING CANOPY CONCEPTUAL RENDERINGS

# SOLAR PAVILION CONCEPTUAL RENDERINGS

# SOLAR PAVILION CONCEPTUAL RENDERINGS

## Where we are

- PBC has recommended moving into Construction Documents phase with the incorporation of site and electrical infrastructure for solar to achieve a Net Zero Building into the Project and Budget
- Sustainable Lexington has recommended moving into Construction Documents phase with the incorporation of site and electrical infrastructure for solar to achieve a Net Zero Building into the Project and Budget
- Both PBC & Sustainable Lexington recommend a value engineering effort to coincide with the Construction Documents phase in order to maintain the Project schedule.

## What we need to move forward

- Direction on the 6 spaces along Mass Ave drive at front of new Police Station
- Direction on integration on solar infrastructure into base project as recommended by PBC & Sustainable Lexington
- Approval to move into Construction Documents

# SOLAR PAVILION CONCEPTUAL RENDERINGS


Tecton ARCHITECTS

PACHECO ROSS ARCHITECTS
CES
FUSS & O'NEILL
ODEH ENGINEERS
RLB

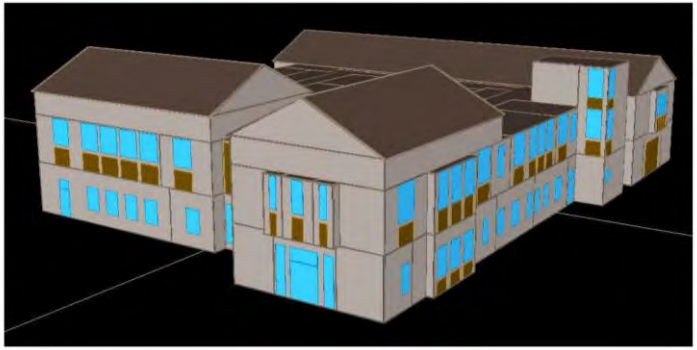
# LEXINGTON POLICE HEADQUARTERS

# ENERGY MODEL ASSUMPTIONS

NEW ECOLOGY
Community-Based Sustainable Development

**Project Information**

| | |
|---|---|
| Project Name | Lexington Police Station |
| Client | Tecton Architects |
| Rating Method | LEED 4.0 and MA Stretch Code |
| Date | 2/2/2022 |
| Building Type | Police Station |
| Project Area total ($ft^2$) | 30,000 |



**Summary of Assumptions for Energy Model**

| Model Input Parameter | LEED 4.0 Baseline Model | MA Stretch Code Baseline Model | Proposed Model |
|---|---|---|---|
| Space Use Type | Police Station | Police Station | Police Station |
| Building Area | 32,868 | 32,868 | 32,868 |
| Operating Schedule | COMNET C2 Schedule | COMNET C2 Schedule | COMNET C2 Schedule |
| Temperature Setpoints °F | Cooling: 75°F | Cooling: 75°F | Cooling: 75°F |
| | Heating : 70°F | Heating : 70°F | Heating : 70°F |
| Weather File | Boston TMY2 | Boston TMY2 | Boston TMY2 |
| HDD65 | 5641 | 5641 | 5641 |
| CDD50 | 2897 | 2897 | 2897 |
| Modeling Guideline / Drawing Set | ASHRAE 90.1-2010 | ASHRAE 90.1-2013 + 780 CMR C406.1 | Design Drawing Set - LEX02AR02 |
| **Building envelope** | **LEED 4.0 Baseline Model** | **MA Stretch Code Baseline Model** | **Proposed Model** |
| Wall | Steel Frame U-0.064 | Steel Frame U-0.055 | Type1:4"Nom. Brick Veneer+1-7/8" Air Space+4" Polyiso Insulation+Air&Vapour Barrier+1/2" Glass Mat Sheating+6" Metal Framing+Cellulose insulation+5/8" Gypsum Wall Board U-0.027<br>Type2:4"Nom. Brick Veneer+1-1/4" Air Space+4" Polyiso Insulation+Air&Vapor Barrier+8"or12"Nom. CMU Backup U-0.037 |
| Slab | F-0.73(no insulation) | F-0.52 (R-15 for 24 in) | U-0.09 |
| Roof | Entirely Above the Deck U-0.048 | Entirely Above the Deck U-0.032 | U-0.022 |
| Window type and U-Value ($Btu/h\text{-}ft^2\text{-}°F$) | Nonmetal Framing U-0.35 | Nonmetal Framing U-0.32 | U-0.24 |
| Window SHGC | SHGC-0.4 | SHGC-0.4 | SHGC-0.23 |
| Doors U-Value ($Btu/h\text{-}ft^2\text{-}°F$) | U-0.5 | U-0.5 | U-0.37 |
| Infiltration Rate | Assumes 0.15 ACH | Assumes 0.15 ACH | Assumes 0.15 ACH |
| **Lighting Lighting Power Density (LPD)** | **LEED 4.0 Baseline Model** | **MA Stretch Code Baseline Model (10% less then code minimum per C406.1)** | **Proposed Model** |
| Corridor LPD (W/SF) | 0.66 | 0.59 | 0.34 |
| Lobby LPD (W/SF) | 0.9 | 0.81 | 2.74 |
| Restrooms LPD (W/SF) | 0.98 | 0.88 | 1.5 |
| Conference/Meeting/Multipurpose LPD (W/SF) | 1.23 | 1.11 | 0.87 |
| Electrical/Mechanical LPD (W/SF) | 0.95 | 0.38 | 1.83 |
| Storage LPD (W/SF) | 0.63 | 0.57 | 0.5 |
| Office LPD (W/SF) | 1.11 | 1.00 | 0.77 |
| Lounge/Recreation/Break LPD (W/SF) | 0.73 | 0.66 | 0.11 |
| Cell LPD (W/SF) | 0.25 | 0.20 | 0.65 |
| Parking Garage LPD (W/SF) | 0.19 | 0.17 | 0.18 |
| Workshop LPD (W/SF) | 1.59 | 1.43 | 0.25 |
| Stairway LPD (W/SF) | 0.69 | 0.62 | 0.36 |
| Laboratory LPD (W/SF) | 1.81 | 1.63 | 0.85 |
| Gym LPD (W/SF) | 0.72 | 0.65 | 0.29 |
| Locker Room LPD (W/SF) | 0.75 | 0.68 | 0.5 |
| Exterior lighting (kW) | 3.9 | 3.90 | 1.6 |
| Lighting controls | n/a | n/a | n/a |
| **Plug-load Energy Power Density (EPD)** | **LEED 4.0 Baseline Model** | **MA Stretch Code Baseline Model** | **0** |
| Corridor EPD (W/SF) | 0.2 | 0.2 | 0.2 |
| Lobby EPD (W/SF) | 0.2 | 0.2 | 0.2 |
| Restrooms EPD (W/SF) | 0.5 | 0.5 | 0.5 |
| Conference/Meeting/Multipurpose EPD (W/SF) | 0.73 | 0.73 | 0.73 |
| Electrical/Mechanical EPD (W/SF) | 0.5 | 0.5 | 0.5 |
| Storage EPD (W/SF) | 0.31 | 0.31 | 0.31 |
| Office EPD (W/SF) | 1.67 | 1.67 | 1.67 |
| Lounge/Recreation/Break EPD (W/SF) | 1.54 | 1.54 | 1.54 |
| Cell EPD (W/SF) | 0.5 | 0.5 | 0.5 |
| Parking Garage EPD (W/SF) | 0 | 0 | 0 |

# ENERGY MODEL ASSUMPTIONS

| | | | |
|---|---|---|---|
| Workshop EPD (W/SF) | 0.5 | 0.5 | 0.5 |
| Stairway EPD (W/SF) | 0.2 | 0.2 | 0.2 |
| Laboratory EPD (W/SF) | 3.34 | 3.34 | 3.34 |
| Gym EPD (W/SF) | 0.67 | 0.67 | 0.67 |
| Locker Room EPD (W/SF) | 0.2 | 0.2 | 0.2 |
| **HVAC System Air-side** | **LEED 4.0 Baseline Model** | **MA Stretch Code Baseline Model (10% more efficient then code minimum per C406.1)** | **Proposed Model** |
| HVAC System | ASHRAE 90.1-2010 System 6: Packaged VAV with PFP Boxes, DX Coils for Cooling & Electric Resistance for Heating | ASHRAE 90.1-2013 System 5: Packaged VAV with Reheat, DX Coils for Cooling & Hot Water Fossil Fuel Boiler for Heating | 1. Air Source VRF - Offices<br>2. HP DOAS + ERV - ventilation in Offices<br>3. HP DOAS + ERV - heating and cooling in cell spaces<br>4. VRF coupled with hydronic unit heaters for heating only spaces<br>5. Mini-Split Heat Pump for mechanical rooms and equipment rooms |
| Cooling Capacity | Auto sized by eQUEST, 15% oversized | Auto sized by eQUEST, 15% oversized | 1. Air Source VRF - 500 MBH-27,000 MBH<br>2. HP DOAS - 140.9 MBH-232.54 MBH<br>3. Mini-Split - 12,000 MBH-24,000 MBH |
| Heating Capacity | Auto sized by eQUEST, 25% oversized | Auto sized by eQUEST, 25% oversized | 1. Air Source VRF - 5600MBH-30,000 MBH<br>2. HP DOAS - 183.5 MBH-282 MBH<br>3. Hydronic unit heaters - 8 MBH-30.7 MBH<br>4. Mini-Split - 18,000 NBH |
| Unitary Efficiency | Heating : boiler efficiency 80% Et<br>Cooling: DX Coil 10 EER | Heating : 80% Boiler<br>Cooling: 10.78 EER | 1. Air Source VRF - 4.15 COP for cooling & 4.2 COP for heating<br>2. HP DOAS - 12 EER for cooling & 3.31 COP for heating<br>3. Hydronic unit heaters -2.8 COP at 47°F |
| Fan System Operation | Constant Volume | Constant Volume | Variable Speed |
| Fan Power | per G3.1.2.9 Pfan =bhpx746/fan motor efficiency | per G3.1.2.9 Pfan =bhpx746/fan motor efficiency | per HVAC schedules |
| **HVAC System Water-side** | **LEED 4.0 Baseline Model** | **MA Stretch Code Baseline Model (10% more efficient then code minimum per C406.1)** | **Proposed Model** |
| # of boilers | n/a | 2 | n/a |
| Boiler Capacity | n/a | Auto sized by eQUEST | n/a |
| Boiler Efficiency | n/a | 88% | n/a |
| Boiler Water Loop Supply Temperature | n/a | 180°F | n/a |
| Hot Water Loop Delta T | n/a | 50°F | n/a |
| HW Loop Reset Parameters | n/a | 180°F at 20°F and below, 150°F at 50°F and above | n/a |
| HW Loop Pump power | n/a | 19 W/gpm | n/a |
| HW Loop Pump Speed Control | n/a | variable | n/a |
| **Service Hot Water System** | **LEED 4.0 Baseline Model** | **MA Stretch Code Baseline Model (HP water heater per C406.1)** | **Proposed Model** |
| Heater Type | Heat Pump Water Heater | Heat Pump Water Heater | Heat Pump Water Heater |
| Hot Water Heater Capacity | Autosized by eQUEST | Autosized by eQUEST | 63,225 Btu/h per heater |
| Hot Water Usage gpm | 0.168 gpm | 0.168 gpm | 0.168 gpm |
| Heater Efficiency | 2.7 COP | 2.7 COP | 2.7 COP |
| **Utility Cost (referencing EIA price data)** | **LEED 4.0 Baseline Model** | **MA Stretch Code Baseline Model** | **Proposed Model** |
| Electricity ($/KWH) | 0.223 | 0.223 | 0.223 |
| Gas ($/THERM) | 1.332 | 1.332 | 1.332 |

# ENERGY MODEL RESULTS - LEED

NEW ECOLOGY
Community-Based Sustainable Development

**Project Information**

| | |
|---|---|
| Project Name | Lexington Police Station |
| Client | Tecton Architects |
| Rating Method | LEED 4.0- ASHRAE 90.1-2010 |
| Date | 2/2/2022 |
| Building Type | Police Station |
| Project Area total (ft² | 32,868 |

**Utility Rates**

| | | |
|---|---|---|
| Electricity | 0.223 | $/kWh |
| Natural Gas | 1.332 | $/THERM |

**Cost Saving Analysis**

| End Use | Baseline - LEED 4.0- ASHRAE 90.1-2010 | | | | End Use | Proposed Design | | | | Energy Savings |
|---|---|---|---|---|---|---|---|---|---|---|
| | Electricity (kWh) | Natural Gas (Therms) | Total Energy Usage (kBtu) | Percent of Total (%) | | Electricity (kWh) | Natural Gas (Therms) | Total Energy Usage (kBtu) | Percent of Total (%) | Percent (%) |
| Interior Lighting | 140,658 | - | 479,925 | 24.4% | Interior Lighting | 118,258 | - | 403,496 | 30.7% | 16% |
| Exterior Lighting | 11,388 | - | 38,856 | 2.0% | Exterior Lighting | 4,672 | - | 15,941 | 1.2% | 59% |
| Misc. Equipment | 109,518 | - | 373,675 | 19.0% | Misc. Equipment | 109,518 | - | 373,675 | 28.4% | 0% |
| Space Heating | 221,930 | - | 757,225 | 38.5% | Space Heating | 51,281 | - | 174,971 | 13.3% | 77% |
| Space Cooling | 50,431 | - | 172,069 | 8.8% | Space Cooling | 47,827 | - | 163,186 | 12.4% | 5% |
| Heat Rejection | - | - | - | 0.0% | Heat Rejection | - | - | - | 0.0% | n/a |
| Pumps & Aux | 2,505 | - | 8,547 | 0.4% | Pumps & Aux | 2,750 | - | 9,383 | 0.7% | -10% |
| Ventilation Fans | 33,991 | - | 115,976 | 5.9% | Ventilation Fans | 44,394 | - | 151,472 | 11.5% | -31% |
| Heat Pump Supplem | - | - | - | 0.0% | Supplement | 1,548 | - | 5,282 | 0.4% | n/a |
| Domestic Hot Water | 5,597 | - | 19,096 | 1.0% | Domestic Hot Water | 5,552 | - | 18,943 | 1.4% | 1% |
| Total Energy by Utili | 576,017 | - | 1,965,369 | 100% | Total Energy by Utility | 385,800 | - | 1,316,350 | 100% | |
| Site Energy (kBtu) | 1,965,369 | - | | | Site Energy (kBtu) | 1,316,350 | - | | | **Energy Savings** |
| Site EUI (kBtu/ft²) | | | 60 | | Site EUI (kBtu/ft²) | | | 40 | | **33%** |
| Total Cost by Type | $ 128,452 | $ - | | | Total Cost by Type | $ 86,033 | $ - | | | **Cost Savings** |
| Total Energy Cost | $ | | 128,452 | | Total Energy Cost | $ | | 86,033 | | **33%** |

# ENERGY MODEL RESULTS - STRETCH

NEW ECOLOGY
Community-Based Sustainable Development

**Project Information**

| | |
|---|---|
| Project Name | Lexington Police Station |
| Client | Tecton Architects |
| Rating Method | Stretch Code 90.1-2013 |
| Date | 2/2/2022 |
| Building Type | Police Station |
| Project Area total (ft² | 32,868 |

**Utility Rates**

| | | |
|---|---|---|
| Electricity | 0.223 | $/kWh |
| Natural Gas | 1.332 | $/THERM |

Three C406.1 Packages in the Stretch Code baseline model:

1. 10% more efficient HVAC performance
2. 10% reduction in lighting power density
3. High-efficient service water heating - electric air source heat pump water heating

**Cost Saving Analysis**

| End Use | Baseline - Stretch Code 90.1-2013 | | | | End Use | Proposed Design | | | | Energy Savings |
|---|---|---|---|---|---|---|---|---|---|---|
| | Electricity (kWh) | Natural Gas (Therms) | Total Energy Usage (kBtu) | Percent of Total (%) | | Electricity (kWh) | Natural Gas (Therms) | Total Energy Usage (kBtu) | Percent of Total (%) | Percent (%) |
| Interior Lighting | 124,320 | - | 424,180 | 25.6% | Interior Lighting | 118,258 | - | 403,496 | 30.7% | 5% |
| Exterior Lighting | 11,388 | - | 38,856 | 2.3% | Exterior Lighting | 4,672 | - | 15,941 | 1.2% | 59% |
| Misc. Equipment | 109,518 | - | 373,675 | 22.6% | Misc. Equipment | 109,518 | - | 373,675 | 28.4% | 0% |
| Space Heating | 255 | 5,338 | 534,694 | 32.3% | Space Heating | 51,281 | - | 174,971 | 13.3% | 67% |
| Space Cooling | 43,466 | - | 148,305 | 9.0% | Space Cooling | 47,827 | - | 163,186 | 12.4% | -10% |
| Heat Rejection | - | - | - | 0.0% | Heat Rejection | - | - | - | 0.0% | n/a |
| Pumps & Aux | 3,223 | - | 10,995 | 0.7% | Pumps & Aux | 2,750 | - | 9,383 | 0.7% | 15% |
| Ventilation Fans | 31,290 | - | 106,762 | 6.4% | Ventilation Fans | 44,394 | - | 151,472 | 11.5% | -42% |
| Heat Pump Supplem | - | - | - | 0.0% | Supplement | 1,548 | - | 5,282 | 0.4% | n/a |
| Domestic Hot Water | 5,631 | - | 19,213 | 1.2% | Domestic Hot Water | 5,552 | - | 18,943 | 1.4% | 1% |
| Total Energy by Utili | 329,090 | 5,338 | 1,656,681 | 100% | Total Energy by Utility | 385,800 | - | 1,316,350 | 100% | |
| Site Energy (kBtu) | 1,122,856 | 533,825 | | | Site Energy (kBtu) | 1,316,350 | - | | | Energy Savings |
| Site EUI (kBtu/ft²) | | | 50 | | Site EUI (kBtu/ft²) | | | 40 | | 21% |